

# Data shows tether produced triple expected current

Early findings from the tethered satellite are revamping space physics theories.

Numerous space physics and plasma theories are being revised or overturned by data gathered during the Tethered Satellite System experiments on STS-75 in March.

Models, accepted by scientists for more than 30 years must be rewritten. This assessment follows analysis by a joint U.S.-Italian Tethered Satellite investigating team.

During STS-75, a tether system was being unreeled to nearly 13 miles above *Columbia's* payload bay. Just short of the full distance, its tether broke. Nevertheless, the science instruments, which had been operating during the five hours of deployment operations, sent a flood of readings that were received and

recorded by scientists on the ground.

"Even the quick-look made to date reveals that this data harvest is rich in content," said Nobie Stone, NASA TSS-1R mission scientist at NASA's Marshall Space Flight Center.

"Perhaps the most significant finding," Stone said, "is that tether currents proved to be up to three times greater than existing theoretical models predicted prior to the mission. With the amount of power generated being directly proportional to the current, this bodes well for technological applications."

"Reversing the direction of current flow puts the system into an electric-motor mode," Stone explained. This harnessed energy could furnish thrust for reboosting a space station, satellite or shuttle in a decaying orbit.

"Traditionally, the primary source of power for long-term space platforms has been solar arrays," Stone said. "Those cells can only produce power when exposed to sunlight during the two-thirds of each 90-minute orbit when a space station, for instance, is not on Earth's dark side. However, a tether system might provide a constant source of energy," he noted. "It is very efficient and might serve as an effective back up power system."

Other revelations from the mission include observations of the satellite's thrusters interacting with the ionosphere while moving in orbit. Stone said that, when the thrusters were fired to adjust the satellite's spin rate, the neutral gas emitted became ionized.

The tethered satellite researchers noted

that, at that point, "a sudden jump" took place in the level of current flow, while the satellite's potential (voltage) dropped several hundred volts. They traced this effect to the small amount of gas, released from the thrusters, becoming ionized in the vicinity of the satellite. A greater, more efficient current flow was observed. "The effect of neutral-gas ionization is not taken into consideration by existing theoretical models of current collection in the ionosphere," Stone said.

Also, for the first time ever, the high voltage plasma sheath and wake of a high-voltage satellite moving rapidly in the ionosphere was measured. "This is virtually impossible to study in a laboratory and is difficult to model mathematically," Stone said.

## CTAP offers summer sessions

JSC's Career Transition Program has a new special topic seminar, "Communications Anxiety," scheduled for June and has enhanced existing seminar offerings.

In the "Communications Anxiety" seminar, employees will learn remedies for communications anxiety and how to increase visibility by effectively expressing personal accomplishments. Employees also will learn helpful anxiety countermeasures and receive specific examples of what to say in career and networking situations.

The basic CTAP career seminar has added "electronic age" resume techniques and "web" tools for career information. The "Starting a Business" seminar has an additional wealth of information on sources, home businesses, franchises, finding and evaluating a business idea and more.

CTAP is a confidential, contractor-run service for civil servants wishing to explore a variety of career-related topics. Call CTAP at x34300 for details about the new "Communications Anxiety" seminar and other seminars that are available. Civil servants are welcome to drop by and visit the CTAP in Bldg. 45, Rm. 308.

## Volunteers still needed for open house in August

Volunteers will be needed to work exhibits as well as assist and provide information to visitors during the open house scheduled for Aug. 24.

In addition, Jesse Gilmore has taken on the duties of open house representative for the YA organization on the Open House Planning Committee.



**FCOD CHILI COOKOFF—**  
**Above: From left, John Maca of the Simulator Operations and Technology Division and Alan Vaughn of Hughes Training check out the chili of Johnny White of Hughes Training during the FCOD Chili Cookoff held earlier this month. The 1995 astronaut candidates, now astronauts after graduating this month, form a live pyramid as part of the competition during the chili cookoff. Winner of best chili went to the Barney team sponsored by the Space Station Program Office.**



Photos by Dale Martin

## Gulf Coast civil servants honor JSC employees

Seven JSC employees were among those recognized recently at a Gilruth Center banquet for their accomplishments and performance at work and in the community through volunteer activities.

The Federal Executive Board and the Federal Business Association honored the employees along with workers from other local federal agencies.

The six employees who received FBA awards certificates were: Sue Garman, Joe Atkinson, Heidi Glaisyer, Sandra Ogden, Bettye Solcher, Rose Flores, and John Stencil.

Atkinson was selected from all of the nominees in the Length of Service Category for his nearly 47 years of service to the government.

## JSC workers selected to gain college skills

Human Resources recently announced selections for the JSC Project Increased Qualifications Program.

Three JSC employees were selected for the FY97 Project IQ Program. The participants selected this year are Jannette Reed of the Human Resources Office and Alice Slay and Cara Walker of the Engineering Directorate.

The Project IQ program provides undergraduate college opportunities to selected employees during duty hours. It helps employees improve skills and qualifications and be more productive in their present jobs. This two-year program gives participants the opportunity to attend college courses during regular duty hours up to eight hours per week.

## Awards banquet set

The Clear Lake Council of Technical Societies will hold its annual awards banquet at 5:30 p.m. June 14 at the Gilruth Center.

Awards will be presented to individuals in several categories including society awards, technical person of the year, technical educator of the year and technical administrator of the year. Students from Pasadena Independent School District will display winning science fair exhibits. The featured speaker is Astronaut Franklin Chang-Diaz.

Tickets cost \$10 and reservations are due noon June 10. For more information call Marcia Taylor at x30195.

# Endeavour to ferry to California for modifications; will fly again in '97

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gave them some good-natured ribbing about the duration of their flight:

"It hardly seems worth the effort to go up in space for only 10 days," she chided.

As the end of STS-77 grew near, Thomas, a native of Australia, and Garneau, a Canadian, each received special greetings. South Australia Premier Dean Brown called Thomas with congratulations as the shuttle passed above Brown's office in Adelaide, Australia, Thomas' hometown. Later, Canadian Prime Minister Jean Chretien called Garneau to congratulate him on the mission and the joint Canadian Space Agency and

NASA experiments that were conducted.

Earlier in the flight, the crew had successfully deployed the Spartan free-flyer, which in turn deployed the Inflatable Antenna Experiment, the first inflatable structure in space since the Echo balloons of the 1960s. Reducing the size and weight of spacecraft components again was the goal.

"Pretty fantastic," Casper said as the silver, tennis court-sized antenna unfurled with the Earth as a backdrop.

"The parabolic antenna has sort of a rippling to it, almost as if it were in a wind," Runco reported as scientists on the ground tried to see whether it had inflated properly.

"In the end, it really took on the shape that we thought it would," said Project Manager Steven Bard. "No matter what, after looking at the data we will have learned a lot."

Bard said inflatable equipment could be important to future spacecraft because it costs less, weighs less, takes up less space and is potentially more reliable during deployment in space.

After Spartan shed the balloon antenna, Casper and Brown rendezvoused with the free flyer and Runco tucked it back in the payload bay with the robot arm.

Throughout the flight, the crew tended experiments in the commercial Spacehab

module that ranged from studies of how aquatic organisms developed in the Aquatic Research Facility to growing large crystals important to electronic devices in the Commercial Float Zone Facility.

The fourth mission of 1996 launched on time at 5:30 a.m. May 19 and landed at 6:09 a.m. CDT Wednesday. It was *Endeavour's* last flight until December 1997, when it will be launched on the STS-88 mission, the first delivery of U.S. hardware for the assembly of the International Space Station. Endeavour will be ferried to Palmdale, Calif., in August for eight months of major modifications in preparation for station assembly missions.

# 'Mir crew very comfortable with each other' Lucid says

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"Everything that we have been doing is going along fairly well," Lucid said. "I don't see anything that will be a real show stopper. The equipment in Priroda is checking out very well."

Lucid completed verification testing of the Microgravity Isolation Monitoring facility last week and began transferring data to scientists this week.

"The feedback that I have had from the ground has been that the scientists are very excited," Lucid said. "They are very interested in the results we have gotten so far."

MIM will be used to characterize the Mir environment during science operations by isolating experiments from vibrations caused by motion by the cosmonauts.

Last week, Lucid also set up and verified the Microgravity Glovebox experiments and performed several life science experiments including sessions that will study the changes in the neurovestibular and the human immune system.

Halfway through her planned 140-day mission, Lucid reported her relationship with her fellow crew members is going well.

"We laugh a little more together

now than we did in the very beginning because we are more comfortable with each other and we understand each other.

"I enjoy working with the experiments that we have. I find it very rewarding and very interesting. I also enjoy looking out the window and looking at the Earth. It has been very rewarding on a long space flight to be able see the changes that are taking place on Earth, especially the northern hemisphere as the seasons changes. We have been able to see the lakes and the rivers and the ice breaking up and see every-

thing turn green."

In Russia, Astronaut John Blaha spent the majority of last week in final training sessions for the U.S. experiments he will conduct during his stay on Mir. Scientists also took muscle and skeletal measurements of Blaha for comparison after his stay on Mir. Blaha will replace Lucid on the Mir during STS-79. Backup Jerry Linenger spent time training on Mir systems and U.S. experiments while Mike Foale underwent water survival training in the Black Sea. Jim Voss spent the majority of last week learning about the Soyuz transport module.

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